

Date: Tuesday, 08/04/2008 4:57:21 PM  
 User: Julie Lecocq

## Process Sheet

<b>Customer</b> : CU-DAR001 Dart Helicopters Services	<b>Drawing Name</b> : 412 X-TUBE INST, LOW NARROW AFT
<b>Job Number</b> : 38488	
<b>Estimate Number</b> : 12817	
<b>P.O. Number</b> :	<b>Part Number</b> : D412664205
<b>This Issue</b> : 08/04/2008 <b>S.O. No.</b> :	<b>Drawing Number</b> : D412-664 -245 REV C
<b>Prsht Rev.</b> : NC	<b>Project Number</b> : N/A
<b>First Issue</b> : / / <b>Type</b> : LANDING GEAR	<b>Drawing Revision</b> : C
<b>Previous Run</b> : 37023	<b>Material</b> :
<b>Written By</b> :	<b>Due Date</b> : 30/05/2008 <b>Qty:</b> 1 <b>Um:</b> Each
<b>Checked &amp; Approved By</b> : <u>JD 08 4 09</u>	
<b>Comment</b> : Est Rev:A New Issue 07-04-05 JLM	

## Additional Product

Job Number:



**SCRAP**

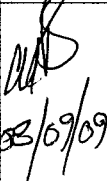
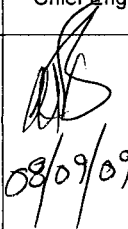
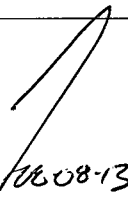
Seq. #:	Machine Or Operation:	Description
1.0	DC	DOCUMENT CONTROL
<b>Comment:</b> DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-205 CHG001		
2.0	PACKAGING 1	PACKAGING RESOURCE #1
<b>Comment:</b> PACKAGING RESOURCE #1		
3.0	D412664205TRN	CROSSTUBE TURNING DETAIL
<b>Comment:</b> Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) CROSSTUBE TURNING DETAIL batch <u>839073</u>		
4.0	BENDING	BENDING MACHINE - SKIDTUBES
<b>Comment:</b> BENDING MACHINE Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010		
5.0	QC6	DIMENSIONAL CHECK
<b>Comment:</b> DIMENSIONAL CHECK		
6.0	D36061	CUFF
<b>Comment:</b> Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s) CUFF Batch:		

**SCRAP**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08/08/13	4.0	Tube is over bent. was used in barrel development	 08/09/09	Tube is scrap / over bent & un-even. change to barrel development.			 08/09/09	 160813

NOTE: Date & initial all entries

Date: Tuesday, 08/04/2008 4:57:21 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST,LOW NARROW AFT

Job Number: 38488

Part Number: D412664205

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

7.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill Rivet holes as per Dwg D412-664-245 using DT8972.

2-Drill pilot holes in tube as per Dwg D412-664-245

3-Ream hole to finish size in tube as per Dwg D412-664-245

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat/Tube & Cuffs as per QSI 005 4.1

9.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

10.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

11.0

OUTSIDE SERV.10

OUTSIDE SERVICES -skids



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

SCVAP

12.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Date: Tuesday, 08/04/2008 4:57:21 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST,LOW NARROW AFT

Job Number: 38488

Part Number: D412664205

Job Number:



Seq. #:

Machine Or Operation:

Description :

13.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

14.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Rivet Cuffs as per Dwg D412-6647-245. with Sika flex in Between tube & Cuff

A/R SIKAFLEX -241/-291 BATCH: \_\_\_\_\_

15.0

CR3212407

CHERRY RIVET



Comment: Qty.: 44.0000 Each(s)/Unit Total : 44.0000 Each(s)

CHERRY RIVET

Batch: \_\_\_\_\_

16.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

17.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

18.0

D31891

Chafing Shield



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Chafing Shield

Batch: \_\_\_\_\_

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 08/04/2008 4:57:21 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST,LOW NARROW AFT

Job Number: 38488

Part Number: D412664205

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

19.0	D3595	Rubber Cushion (per sq ft)
------	-------	----------------------------



Comment: Qty.: 0.0536 sf(s)/Unit Total : 0.0536 sf(s)  
Rubber Cushion  
Cut to .630" X 5.7" X 2PCS  
Batch: \_\_\_\_\_

20.0	D28961	Support
------	--------	---------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)  
Pick:  
Qty Part number Description Batch  
1 D2896-1 Support \_\_\_\_\_

21.0	D2856600	Abrasion Strip
------	----------	----------------



Comment: Qty.: 0.9450 f(s)/Unit Total : 0.9450 f(s)  
Abrasion Strip  
2 X D2856-600-1009  
Batch: \_\_\_\_\_

22.0	MS2192028	Clamp(per MIL-DTL-8783C)
------	-----------	--------------------------



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)  
Pick:  
Qty Part number Description Batch  
4 MS21920-28 Clamp \_\_\_\_\_

23.0	MS2192030	clamp(per MIL-DTL-8783C)
------	-----------	--------------------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)  
clamp(per MIL-DTL-8783C)  
batch: \_\_\_\_\_

24.0	CROSSTUBES	CROSSTUBES RESOURCE 1
------	------------	-----------------------



Comment: LANDING GEAR RESOURCE 1  
Assemble as per Dwg D412-664-245

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



Date: Tuesday, 08/04/2008 4:57:21 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST,LOW NARROW AFT

Job Number: 38488

Part Number: D412664205

Job Number:



Seq. #:

Machine Or Operation:

Description :

2-Install Chaffing Shields

3-Instal support with magnobond 6398 per dwg D412-664-245,  
cure for 12hrs before packaging.

Time & date of application: \_\_\_\_\_

Batch: \_\_\_\_\_

25.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

26.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

27.0

AN640A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: \_\_\_\_\_

28.0

AN641A

Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

Batch: \_\_\_\_\_

29.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

Batch: \_\_\_\_\_

30.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

Batch: \_\_\_\_\_

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Date: Tuesday, 08/04/2008 4:57:21 PM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 412 X-TUBE INST,LOW NARROW AFT

Job Number: 38488

Part Number: D412664205

Job Number:



Seq. #:

Machine Or Operation:

Description :

31.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

32.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-105

33.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 08-09-09

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

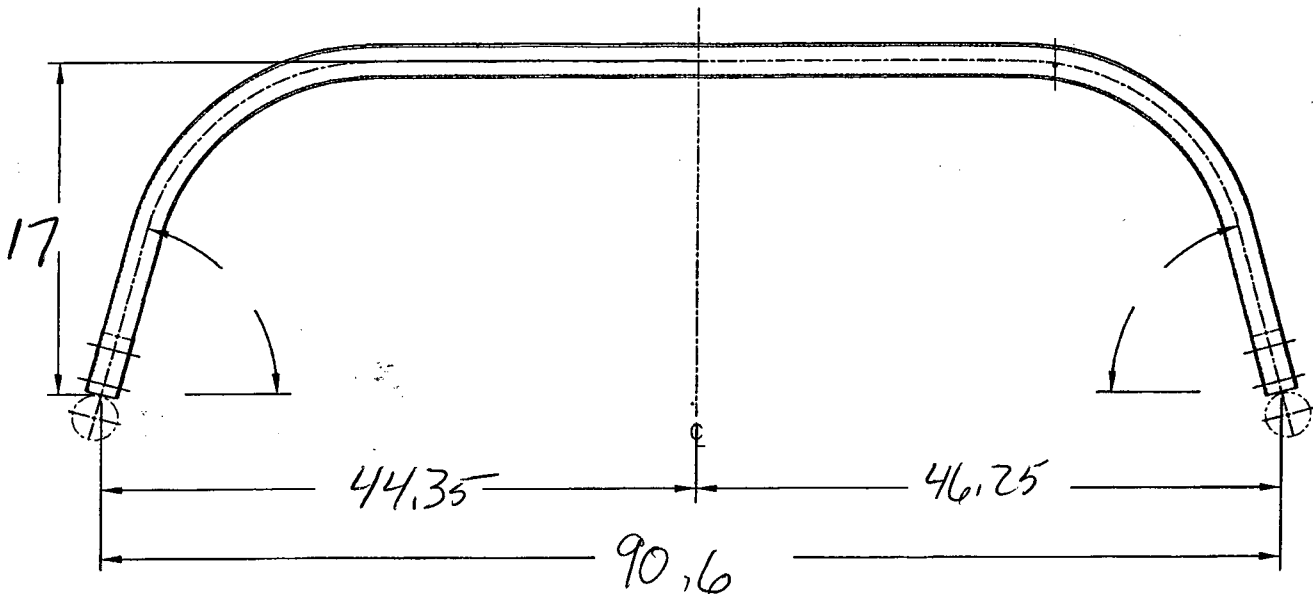
QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	
<b>Description:</b> Crosstube Low Narrow Aft (412)		<b>Part Number:</b>	<b>D412-664-205</b>
<b>Inspection Dwg:</b> D412-664-245 <b>Rev:</b> C		<b>Page 1 of 1</b>	

Required Dimension	Min	Max
Height	16.69	16.95
1/2 Span	46.47	46.73
Angle	49°	52°
Total Span	92.94	93.46



Comments
<i>tube is overbent</i>

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.04.27	New Issue	KJ/JM <i>[Signature]</i>	<i>[Signature]</i>

SHOP COPY  
 RETURN TO  
 ENGINEERING  
 UNCONTROLLED COPY  
 SUBJECT TO AMENDMENT  
 WITHOUT NOTICE  
 WORK ORDER  
 NO. 38788

**DART**

DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D412-664-245	REV. C SHEET 1 OF 3
DATE 07.03.29		TITLE CROSSTUBE ASS'Y (412 LOW-N AFT) NTS	
A	06.12.01	NEW ISSUE	
B	07.03.01	CHG CUFF AREA, CHG RUBBER CUSHION	
C	07.03.29	CHG RIVET AND RUBBER CUSHION	

**RELEASED**07.04.24 *[Signature]***PARTS LIST:**

Qty	Part Number	Description
X	D412-664-245	CROSSTUBE ASSEMBLY (412 LOW-NARROW AFT)
1	D6009-129	CROSSTUBE
2	D2856-600-1009	ABRASION STRIP
1	D2896-1	SUPPORT
2	D3189-1	CHAFING SHIELD
2	D3595-063-570	RUBBER CUSHION
2	D3606-1	CUFF
44	CR3212-4-07	RIVET (OR M7885/3-4-07)
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH = 123.59±0.020 (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 14) INSTALL D3606-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 15) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY

RETURN TO

ENGINEERING

UNCONTROLLED COPY

SUBJECT TO AMENDMENT

WITHOUT NOTICE

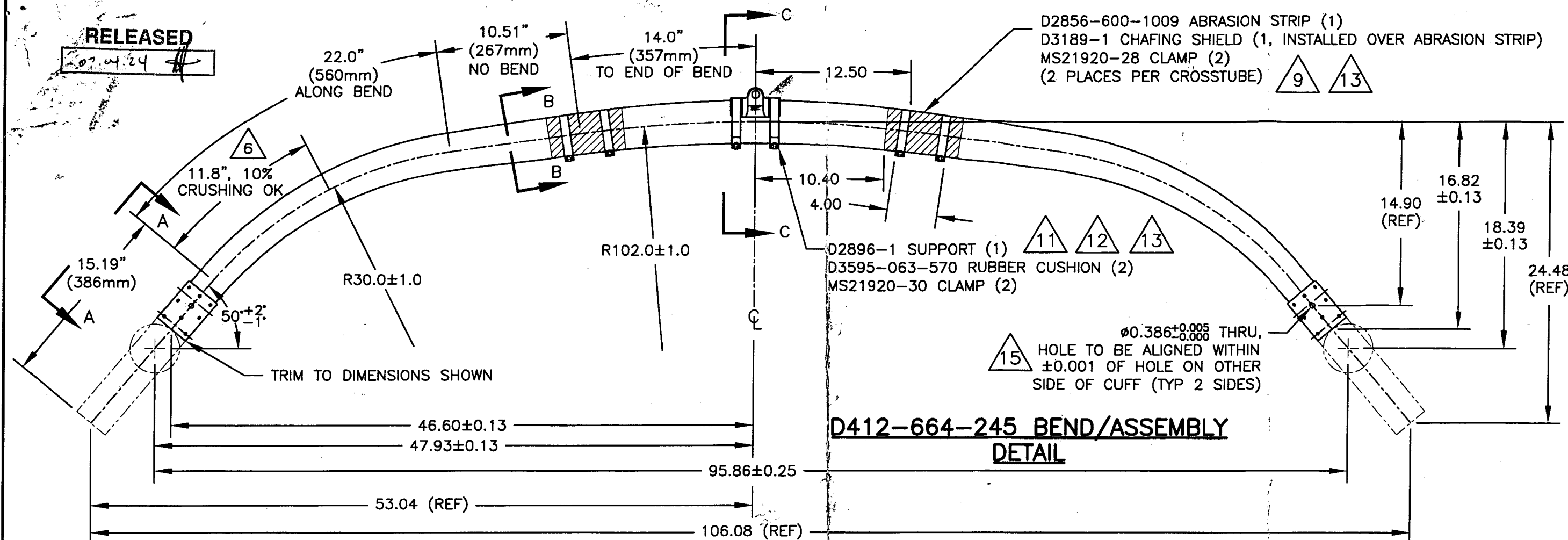
WORK ORDER

NO. 38488

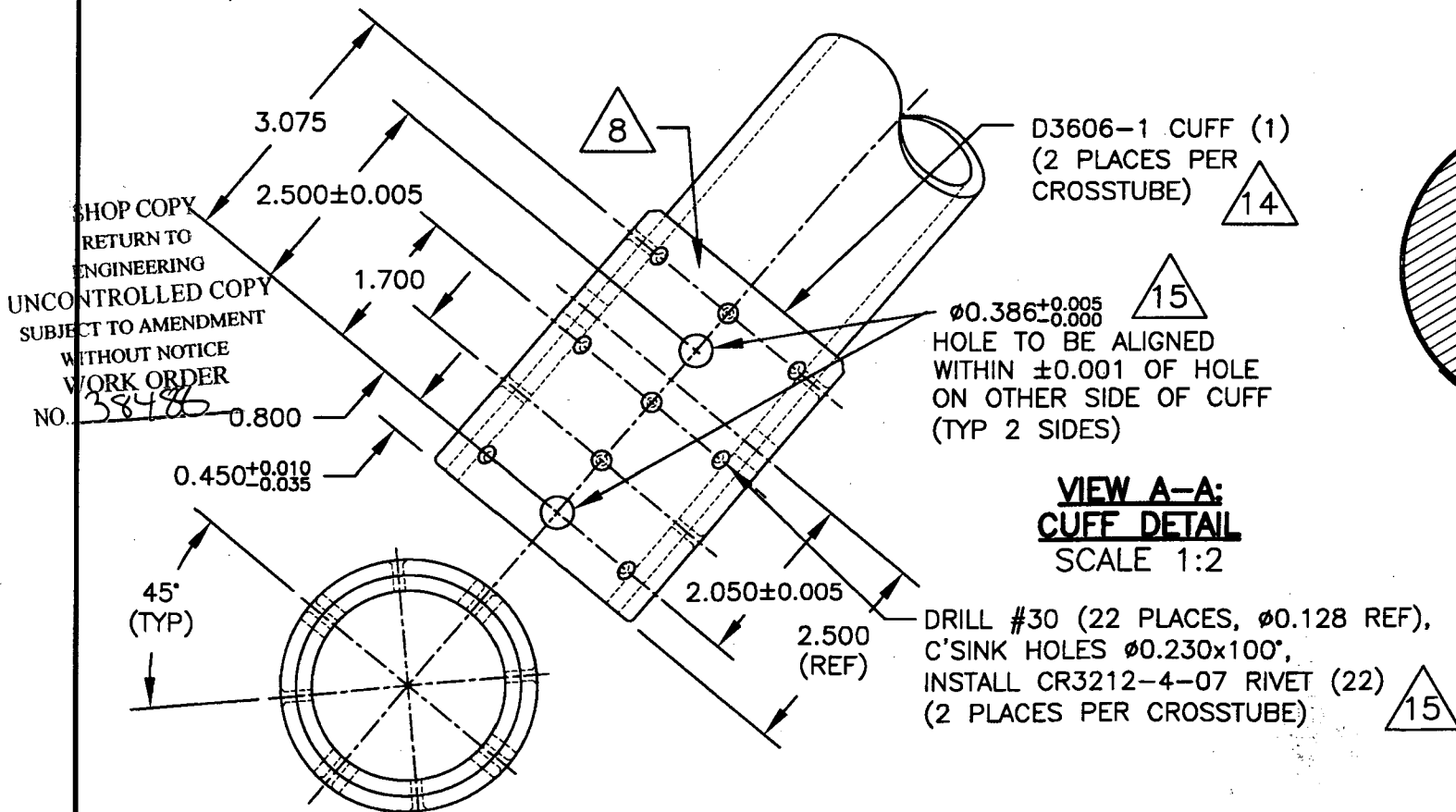
**Copyright © 2006 by DART AEROSPACE LTD**

THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.

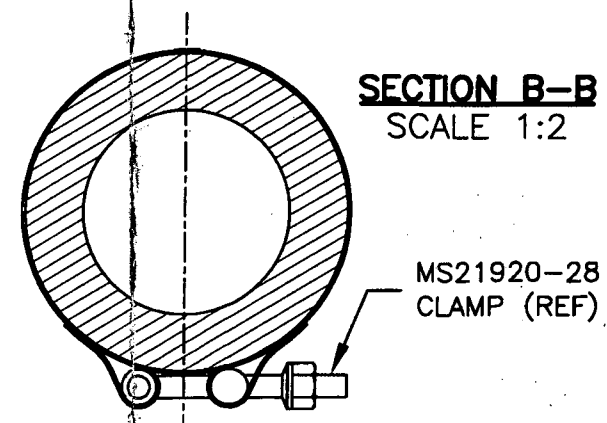
RELEASED



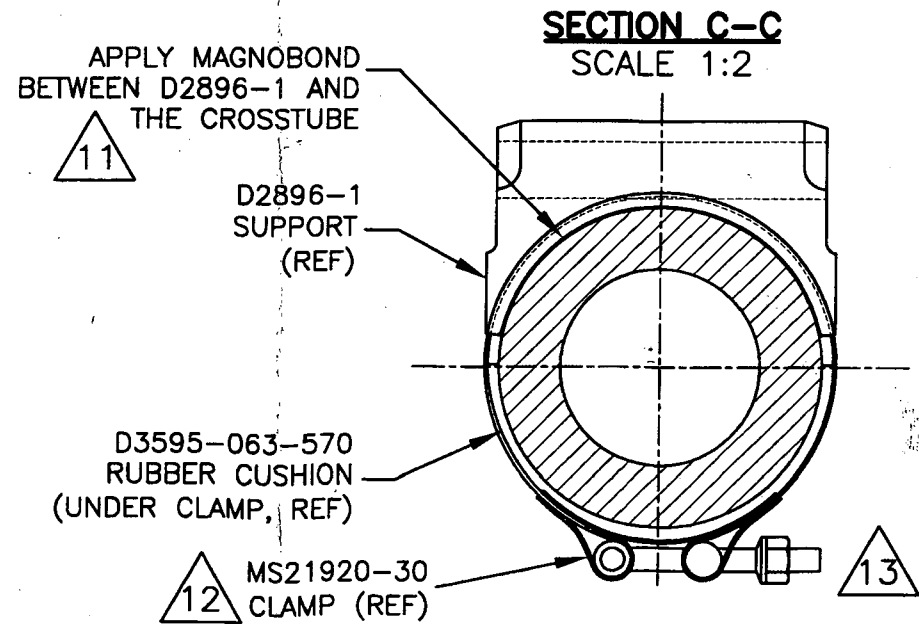
**D412-664-245 BEND/ASSEMBLY  
DETAIL**



**VIEW A-A:  
CUFF DETAIL  
SCALE 1:2**

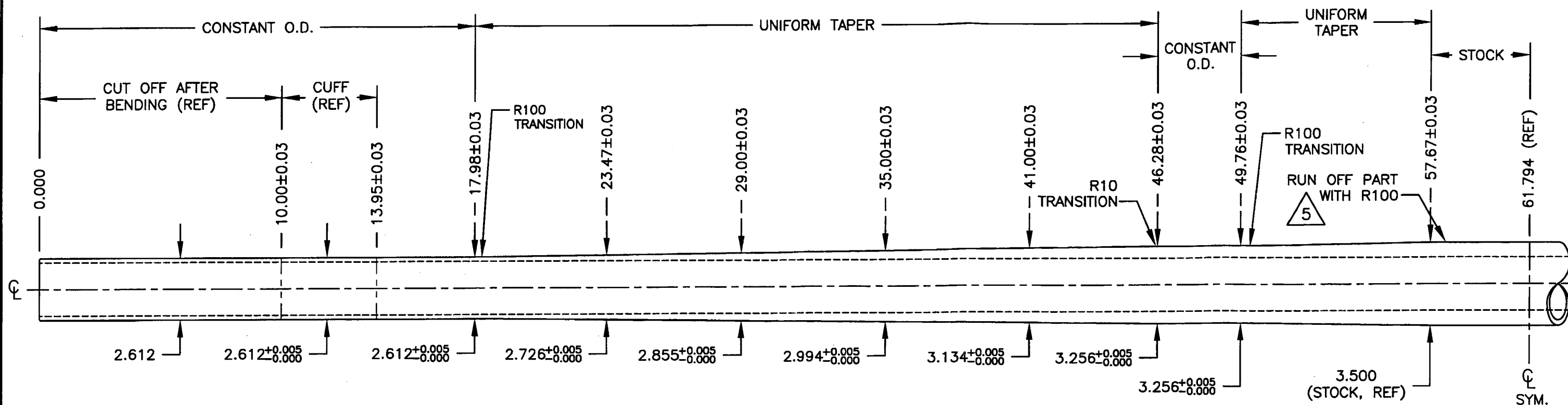


**SECTION B-B  
SCALE 1:2**



**SECTION C-C  
SCALE 1:2**

COPYRIGHT © 2008 BY DART AEROSPACE LTD.		DESIGN	q	DRAWN BY	q	<b>DART</b>	<b>DART AEROSPACE LTD.</b> HAWKESBURY, ONTARIO, CANADA
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.		CHECKED	#	APPROVED	#	DRAWING NO.	REV. C
		DATE	07.03.29			D412-664-245	SHEET 2 OF 3
						TITLE	SCALE
						CROSSTUBE (412 LOW-NARROW AFT)	1:8



# **D412-664-245 MACHINING DETAIL**

RELEASED

07.04.19

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 38488

COPYRIGHT © 2006 BY DART AEROSPACE LTD.		DESIGN	q	DRAWN BY	q	<b>DART</b>	DART AEROSPACE LTD. HAMMERSBURY, ONTARIO, CANADA
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.		CHECKED	q	APPROVED	q	DRAWING NO.	REV. C
		DATE	07.03.29			D412-664-245	SHEET 3 OF 3
						TITLE	SCALE
						CROSSTUBE (412 LOW-NARROW AFT)	1:4



